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AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness, comprising:

~~preparing semiconductor nano-crystalline anatase TiO_2 sol~~ using titanium alkoxide $Ti(OR)_4$ as a main component;

~~in combination~~

combining with chelating agents and~~in~~ aqueous solution to form TiO_2-SCA gel;

peptizing the TiO_2 gel by adjusting the pH value thereof;

forming crystalline TiO_2 particles with the TiO_2 gel via a hydrothermal process to form the semiconductor nano-crystalline anatase TiO_2 sol;

dip coating said semiconductor nano-crystalline anatase TiO_2 sol on a surface of a fluorescent lamp tube; and

baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol, to form a photocatalytic ~~coating~~ coated fluorescent lamp capable of cleaning air;

wherein said baking step is carried out at a low temperature in a range of about 100-250°; and

~~and~~ wherein, when said photocatalytic ~~coating~~ coated fluorescent lamp is turned on, the brightness of said photocatalytic ~~coating~~ coated fluorescent lamp is greater than a lamp not provided with said semiconductor anatase TiO_2 sol coating, due to both ~~increases because of~~ a fluorescent property of said semiconductor anatase TiO_2 sol coating, and ~~due to~~ the anatase TiO_2 coating ~~have had~~ having an ability to photocatalyze visible light ~~photocatalytic ability thereof~~,

whereby a small amount of UV light (UVA) and blue light from the fluorescent lamp is absorbed by said anatase TiO_2 coating, thus generating active species such as electron-hole pairs which are capable of cleaning the air.

2. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the step of preparing semiconductor nano-crystalline anatase TiO_2 sol using said chelating agents in aqueous solution comprises ~~the following steps~~:

using an acid process to prepare anatase TiO_2 sol; and

adding H_4TiO_4 solution to ~~a~~ an H_4TiO_4/TiO_2 ratio of about 0-10 wt %, thereby improving thickness, adhesion, and hardness of said semiconductor nano-crystalline anatase TiO_2 sol coating.

3. (Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1~~,~~ wherein the step of peptizing said TiO2 gel by adjusting the PH value of the TiO_2-SCA gel comprises~~:preparing semiconductor nano-crystalline anatase TiO2 sol using said chelating agents in aqueous solution comprises the following steps:~~

using an alkaline process to prepare anatase TiO_2 sol and adjusting the pH to greater than 7.0~~;~~ ~~and~~

~~adding H4TiO4 solution to a H4TiO4/ TiO2 ratio of about 0-10wt%, thereby improving thickness, adhesion, and hardness of said semiconductor nano crystalline anatase TiO2 sol coating.~~

4. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim ~~1~~, wherein the step of preparing semiconductor nano-crystalline anatase TiO_2 sol using said chelating agents in aqueous solution comprises ~~the following steps~~:

using the process to prepare anatase TiO_2 sol; and

adding a water solution of precious metal salts or transition metal salt to the anatase TiO_2 sol ~~for the~~ to obtain an M^+n/anatase TiO_2 ratio of about 0-1.0 wt %, thereby improving visible light photocatalytic ability for air cleaning.

5. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim ~~1~~, wherein the step of preparing semiconductor nano-crystalline anatase TiO_2 sol using said chelating agents in aqueous solution comprises ~~the following steps~~:

mixing Eu or rare earth metal salt ~~alcoholic~~ solution to the process to prepare anatase TiO_2 sol ~~with $Ti(OR)_4$ for the~~ to obtain an Eu^+3 or rare earth ~~metal ions.~~metal ions/anatase TiO_2 ratio of about 0-1.0 wt %, and

using the process to prepare Eu or rare earth metal doped anatase TiO_2 sol, thereby improving brightness of the fluorescent lamp coated with the anatase TiO_2 sol.

6. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1~~,~~, wherein the step of dip coating said semiconductor nano-crystalline anatase TiO_2 sol on the surface of said fluorescent lamp tube further comprises ~~the steps of~~:

dipping a coating frame arranged with an array of fluorescent lamp tubes into said semiconductor nano-crystalline anatase TiO_2 sol by using a coating machine; and

dip coating said lamp tubes and readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed ~~depends~~ is variable based on ~~a~~ the desired thickness of coating and concentration of said anatase TiO_2 sol;

~~and~~ wherein the step of baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol to form a photocatalytic coating fluorescent lamp capable of cleaning air and increasing brightness, further comprises ~~the following steps of~~:

placing said coated fluorescent lamp tubes and said coating frame into an oven; and

baking said fluorescent lamp tubes to form a photocatalytic coating fluorescent lamp;

wherein said baking process is carried out at a temperature of 150-250°C for 10-30 minutes, and accurate conditions depend on the types of said anatase TiO_2 sol, heat resistance of said fluorescent lamp tubes, hardness of said anatase TiO2 coating, and manufacture throughput.

7. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1~~,~~,

wherein the step of dip coating said semiconductor nano-crystalline anatase TiO_2 sol on surface of said fluorescent lamp tube further comprises ~~the steps of~~:

dipping a coating frame arranged with an array of fluorescent lamp tubes into SiO_2 sol or H_4TiO_4 solution by using a coating machine;

dip coating said fluorescent lamp tubes and readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed depends on the desired thickness of coating and concentration of said SiO_2 sol or H_4TiO_4 solution;

baking said fluorescent lamp tubes dipped with SiO_2 sol or H_4TiO_4 solution at a temperature of about 50-100°C for about 10-30 minutes, wherein the advanced SiO_2 sol or H_4TiO_4 solution dipping improves optical properties, adhesion, and hardness of said semiconductor nano-crystalline anatase TiO_2 sol coating;

dip coating said lamp tubes in said anatase TiO_2 sol; and

readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed depends on the desired thickness of coating and concentration of said anatase TiO_2 sol;

~~and~~ wherein the step of baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol to form a photocatalytic coating fluorescent lamp capable of cleaning air and increasing brightness further comprises ~~the following steps of~~:

placing said coated fluorescent lamp tubes and said coating frame into an oven; and

baking said fluorescent lamp tubes to form a photocatalytic coating fluorescent lamp;

wherein said baking process is carried out at a temperature of about 150-250°C for about 10-30 minutes, and accurate condition depends on the types of said anatase TiO_2 sol, heat resistance of said fluorescent lamp tubes, hardness of said anatase TiO_2 coating, and designed manufacture throughput.

8. (Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and ~~increase~~ increasing brightness as claimed in claim 1, wherein said fluorescent lamp is selected from the group consisting of ~~comprises~~ normal fluorescent lamps, RGB three wave fluorescent lamps, and high frequency fluorescent lamps.

9. (Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and ~~increase~~ increasing brightness as claimed in claim 1, wherein said fluorescent lamp is selected from the group consisting of~~comprises~~ a straight tube, an annular tube, a U-shaped tube, a spiral tube, and a special dual-layer tube, and wherein ~~when implementing~~ said dip coating step ~~method~~ for fixing said lamp includes a dual head fixing method and a single end fixing method.

10. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and ~~increase~~ increasing brightness as claimed in claim 1, wherein, before dip coating said semiconductor nano-crystalline anatase TiO_2 sol on the surface of a fluorescent lamp tube, wherein the method further comprises ~~the following steps of~~:

arranging said fluorescent lamp tube on a coating frame;

washing said fluorescent lamp tube and said coating frame; and

drying said fluorescent lamp tube and said coating frame.

11. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increase brightness as claimed in claim ~~10~~ 9, wherein said straight tube dual head fluorescent lamp uses said dual head fixing method wherein, before arranging said fluorescent lamp tubes on said coating frame, the method further ~~comprising the following steps before arranging said fluorescent lamp tubes on said coating frame~~comprises:

masking a metal portion at both ends of each of said straight tube dual head fluorescent lamps using protection sleeves or thermal plastic sleeves; and

arranging said straight tube dual head fluorescent lamps through holes on said coating frame and fixing ~~said~~ both ends of each of said dual head fluorescent lamps by means of a clipping mechanism disposed at an upper plate and lower plate of said coating frame, so that about 1-100 fluorescent lamps can be arranged on said coating frame.

12. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air as claimed in claim 11, ~~wherein said straight tube dual head fluorescent lamps are fixed by using a dual head fixing method, and~~ wherein a method of washing said fluorescent lamp tube and said coating frame comprises dipping said fluorescent lamp tube and said coating frame into solution containing surfactants for removing oil, followed by rinsing in de-ionized water to ~~removing~~ remove said surfactants.

13. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and ~~increase~~ increasing brightness as claimed in claim 12, ~~wherein said straight tube dual head fluorescent lamps are fixed by using a dual head fixing method, and~~ wherein said method for drying said fluorescent lamp tube and said coating frame comprises placing said fluorescent lamp tube and said coating frame into a drying apparatus, and drying said fluorescent lamp tube and said coating frame with heated air.

14. (Cancelled)

15. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and ~~increase~~ increasing brightness as claimed in claim ~~14~~13, wherein ~~said straight tube dual head fluorescent lamps are fixed by using a dual head fixing method, and~~ said dried fluorescent lamp tube and said coating frame are subjected to ~~said~~ an anatase TiO_2 sol dip coating ~~step as defined in claim 6~~ which comprises:

dipping a coating frame arranged with an array of fluorescent lamp tubes into said semiconductor nano-crystalline anatase TiO_2 sol by using a coating machine; and

dip coating said lamp tubes and readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed is variable based on the desired thickness of coating and concentration of said anatase TiO_2 sol;

wherein the step of baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol to form a photocatalytic coating fluorescent lamp capable of cleaning air and increasing brightness, further comprises:

placing said coated fluorescent lamp tubes and said coating frame into an oven; and

baking said fluorescent lamp tubes to form a photocatalytic coating fluorescent lamp;

wherein said baking process is carried out at a temperature of 150-250°C for 10-30 minutes, and accurate conditions depend on the types of said anatase TiO_2 sol, heat resistance of said fluorescent lamp tubes, hardness of said anatase TiO2 coating, and manufacture throughput.

16. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increase brightness as claimed in claim 15, wherein ~~said straight tube dual head fluorescent lamps are fixed by using a dual head fixing method, and~~ said dried fluorescent lamp tube and said coating frame are subjected to ~~said~~ a dip coating ~~step as defined in claim 7~~, after SiO_2 sol or H_4TiO_4 solution dip coating is performed, followed by anatase TiO_2 sol dip coating, wherein the dip coating step comprises:

dipping a coating frame arranged with an array of fluprescent lamp tubes into SiO_2 sol or H_4TiO_4 solution by using a coating machine;

dip coating said fluorescent lamp tubes and readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed depends on the desired thickness of coating and concentration of said SiO_2 sol or H_4TiO_4 solution;

baking said fluorescent lamp tubes dipped with SiO_2 sol or H_4TiO_4 solution at a temperature of about 50-100°C for about 10-30 minutes, wherein the advanced SiO_2 sol or H_4TiO_4 solution dipping improves optical properties, adhesion, and hardness of said semiconductor nano-crystalline anatase TiO_2 sol coating;

dip coating said lamp tubes in said anatase TiO_2 sol; and

readily pulling out said coating frame and said lamp tubes at a fixed pull-out speed of about 10-30 cm/min, wherein said pull-out speed depends on the desired thickness of coating and concentration of said anatase TiO_2 sol;

wherein the step of baking said fluorescent lamp tube coated with said semiconductor nano-crystalline anatase TiO_2 sol to form a photocatalytic coating fluorescent lamp capable of cleaning air and increasing brightness further comprises:

placing said coated fluorescent lamp tubes and said coating frame into an oven; and

baking said fluorescent lamp tubes to form a photocatalytic coating fluorescent lamp;

wherein said baking process is carried out at a temperature of about 150-250°C for about 10-30 minutes, and accurate condition depends on the types of said anatase TiO_2 sol, heat resistance of said fluorescent lamp tubes, hardness of said anatase TiO_2 coating, and designed manufacture throughput.

17. (Withdrawn - Currently Amended) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increase brightness as claimed in claim ~~8~~ 9, wherein said single-end fluorescent lamps are fixed by using ~~a~~ said single-end fixing method, and wherein a method for arranging said fluorescent lamp tubes on said coating frame comprises:

selecting same type single-end fluorescent lamps or special fluorescent lamps; and

connecting and fixing said the single-end fluorescent lamps to a clipping mechanism on said coating frame;

arranging ~~wherein~~ about 1-100 ~~pieces of~~ said ~~the~~ single-end fluorescent lamps ~~can be arranged~~ on said coating frame, depending on the size of said coating frame and pitch thereof.

18-25. (Cancelled)

26. (New) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the R of Ti(OR)4 is a hydrocarbon group, C_nH_{2n+1}, where n=1-5, and is selected from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, t-butyl, sec-butyl, and pentyl.

27. (New) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the chelating agents are selected from the group consisting of Acetonacetate [$RC(O)CH_2C(O)R$], amino acid [$RCH(NH_2)COOH$], succinic acid [$HOOCCH(R)COOH$], and organic alcohol [$RC_6H_3(OCH_3)OH$].

28. (New) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the amount of chelating agent and /$Ti(OR)_4$ has a molar ratio of 0.01-1.0 for the chelating agent.

29. (New) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the aqueous solution is water based.

30. (New) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 1, wherein the TiO_2-SCA gel is $H_yTiO_{[(4-y)/2+y]}$, $H_xTiO_{[(3-x)/2+x]}$-SCA gel or $H_yTiO_{[(4-y)/2+y]}$ gel.

31. (New) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 2, wherein the step of using acid process to prepare anatase TiO_2 sol and adjust the pH to less than 2.5 comprises:

adding inorganic acids such as HNO_3, HCl or HF, or adding organic salts such as CH_3COOH or RCOOH to make the pH less than 2.5.

32. (New) The method for fabricating a photocatalytic fluorescent lamp capable of cleaning air and increasing brightness as claimed in claim 3, wherein the step of using alkaline process to prepare anatase TiO_2 sol and adjust the pH to greater than 7.0 comprises:

adding inorganic alkali such as NH_3 or NH_4OH, or adding organic alkali such as NR_3 or R_4NOH, to make the pH greater than 7.

33. (New) A method for fabricating semiconductor nano-crystalline anatase TiO_2 sol, comprising:

preparing titanium alkoxide $Ti(OR)_4$ as a main component;

combining said titanium alkoxide $Ti(OR)_4$ with chelating agents and an aqueous solution to form a TiO_2-SCA gel;

peptizing said TiO_2-SCA gel by adjusting the pH value thereof; and

forming crystalline TiO_2 particles with the TiO_2 gel via a hydrothermal process.